ELECTRONIC EQUIPMENT WITH SCREEN PAN AND ZOOM FUNCTIONS USING MOTION

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates generally to electronic equipment and, more particularly, to electronic equipment that includes motion activated pan and zoom functions for viewing a virtual page, and a method of performing motion activated pan and zoom functions on electronic equipment.

DESCRIPTION OF THE RELATED ART

[0002] Conventional mobile phones, in addition to providing voice communication capabilities, also provide a number of non-voice related features. For example, mobile phones can be used to surf the internet, transmit and receive messages (e.g., emails and text messages), play music and videos, take and display photographs, as well as a number of other features. While these features utilize various subsystems of the mobile phone, one subsystem that often is used in all of these features is the display subsystem.

[0003] In designing the physical characteristics of mobile phones, a number of considerations are taken into account. Two features of mobile phones that are highly desirable are the size of the mobile phone (generally a smaller phone is preferred) and the viewing area provided by the mobile phone's display (generally a larger viewing area is preferred). However, as the size of the phone is reduced, the size of the display (and thus the viewing area) also is reduced. Conversely, as the viewing area of the display (and thus the display size) is increased, the size of the phone is increased. Consequently, a compromise is reached between the size of the mobile phone and the display viewing area such that satisfactory operation and portability are achieved.

[0004] While the above compromise between mobile phone size and display viewing area provides satisfactory operation of the mobile phone, there are some drawbacks. For example, current web pages are formatted for use with conventional computer displays. When such web pages are viewed on conventional mobile phone displays (which are substantially smaller than a computer display), only a portion of the web page can be reasonably viewed on the screen. To view portions not shown on the display, the user must scroll through the web page using the mobile phone's keypad, which can be a slow and tedious process. As a result, special web pages particularly suited for the small displays of mobile phones have been developed. Such web pages, however, typically do not include the content of their larger counter parts.

[0005] Similar issues exist for other media viewed on the mobile phone's display. For example, photographs often are taken and/or shared via mobile phones, wherein the photographs are viewed on the mobile phone's display. Often it is desired to zoom in and/or out of the photographic image and/or pan the photographic image on the display. Again, this requires the user to manipulate the mobile phone's keypad. As will be appreciated, such problems can arise for any application that requires use of the mobile phone's display.

[0006] In an attempt to address the above issues, motion driven panning of screen displays has been implemented in mobile phones. In such systems, the motion of the mobile phone is correlated to a pan request (e.g., motion to the right indexes the display to the right, motion to the left indexes the display to the left, etc.). While such systems are effective, they do not provide the user with precise control of the pan function. Instead, each motion indexes the display a predetermined amount. For example, if a user wishes to pan right on the display, he must move or "shake" the mobile phone in the right direction, which causes the display to index a predetermined amount to the right (e.g., the image appears to snap or tab over a predetermined distance). The user then must look at the display to determine if the screen shows the desired content. If not, then the user must again move the phone to the right to initiate another pan request, causing the display to again index by the predetermined distance.

SUMMARY

[0007] The present invention enables a mobile phone to easily and intuitively pan and zoom content viewed on the mobile phone's display. A motion sensor, such as an accelerometer or the like, detects motion of the mobile phone (e.g., forward/reverse, sideways, up/down, rotate, etc.). When viewing content on the display, this motion can be translated into pan or zoom functions, such that the user need not manipulate the mobile phone's keypad. Further, the motion of the phone (e.g., direction and velocity) is correlated to a virtual page image such that the pan and/or zoom functions can simulate the movement of a window or magnifying glass over a large document, such as a newspaper, for example. The overall viewing effect is smoother and more precise than using the keypad and/or prior art motion panning systems.

[0008] According to one aspect of the invention, there is provided an electronic equipment that includes a display for viewing a virtual page, a transducer operable to detect motion of the electronic equipment, and a control circuit for providing information to the display. The control circuit is responsive to detected motion to perform at least one of a pan or zoom of information provided to the display, wherein the pan and/or zoom correspond to a direction and velocity of the detected motion.

[0009] According to another aspect, the transducer is operable to generate a motion signal that corresponds to acceleration and/or deceleration of the electronic equipment, and the control circuit is operable to determine a velocity of the electronic equipment from the motion signal.

[0010] According to another aspect, the transducer comprises a signal conditioning circuit to filter out signals representing motion not representative of intended motion of the electronic equipment.

[0011] According to another aspect, the signal conditioning circuit comprises a low pass filter.

[0012] According to another aspect, the electronic equipment includes a motion signal processing circuit operative to provide a motion signal indicative of duration of the motion, amplitude of the motion, and/or frequency of the motion. The motion signal processing circuit can include at least one of a low pass filter, a threshold detector, an amplitude detector or a frequency detector.

[0013] According to another aspect, the transducer comprises an accelerometer, a velocimeter or a signal detector.

[0014] According to another aspect, the transducer is operable to detect at least one of acceleration, position, rotation or proximity.